

DISPENSING INTERMEDIATE LAYERS

5 The present invention concerns a method for dispensing an intermediate layer of card-board/paper/film from a web rolled up in a supply, preferably for laying between layers of stackable items on pallets, where the free end of the rolled up supply is moved by feeding means across a table that includes a mechanical cutter unit which is cutting an intermediate layer from the web with a length suitable for an actual pallet size, and from which table the cut intermediate layer is ready for further handling for interposing and laying between the layers of stackable items on a relevant pallet.

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The invention also concerns a machine for performing the method.

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The invention also concerns use of the machine according to the invention for dispensing intermediate layers in connection with loading pallets or the like with stackable items.

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Such a method is indicated in US 4 941 374 in combination with a method and a machine for loading pallets with stackable items, where the dispensed and cut intermediate layers are laid upon each of the layers of stackable items laid on the pallet by means of a robot arm with a suction cup lift also utilised for stacking the items.

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The intermediate layer serves to stabilise the items stacked in layers upon the pallet so that the items do not fall off the pallet during handling of the latter, and furthermore that the stacks are not mutually displaced. The reason for this is that it will often not be possible to lay out the stackable items in a bond so that the items are interlocking when stacked on the pallet.

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The above machine and method has the advantage that the intermediate layers fit actual pallet face size, making the palletising machine very flexible, since intermediate layers are not to be acquired with different dimensions for different palletising tasks, as the intermediate layers are pulled out from the supply and adapted in size with a cutter unit, after which the intermediate layers are laid upon the last laid, uppermost layer of stackable items on the pallet.

The above machine furthermore solves a technical problem constituted in that the suction force used in connection with stacking the stackable items on the pallet is probably different from the suction force needed for lifting an intermediate layer from a stack of such and laying it upon the top layer of stacked items. This means that if the suction lift unit is operated with the same vacuum when handling the stackable items as well as when handling the intermediate layers, it will occur with great probability that two or more sheets will often be carried with the suction lift in connection with handling the sheets, at least a part of the way, after which one or more sheets are lost on the floor, which is not suitable, neither for effecting the palletising procedure nor for the order that should prevail in an areas in which machine operations are to be performed.

The intermediate layers used are typically constituted by cardboard or paper pieces where the tensile force of the said materials is utilised for ensuring that the stackable items are not moving sideways and falling off the pallet.

Even though the intermediate layer, when interposed between the stacked layers of stackable items, to a large extent is safeguarding items against falling off the pallet, it cannot be excluded that from time to time some of the stackable items are lost from a stacked pallet due to the stackable items sliding on the intermediate layers, a situation which is of course not desirable. Special intermediate layers have thus been developed, having their surface coated with a non-skid coating that to a high degree counteracts the said undesired sliding of the items in layers stacked on a pallet.

The laying of these intermediate layers with non-skid coating, however, constitutes a problem, as the individual pieces in a stack of intermediate layers with non-skid coating on the surface will tend to adhere to each other, causing it being practically impossible to perform laying of intermediate layers in a technically and economically defensible way with the machine of the kind indicated in the introduction, since by taking an intermediate layer from the stack with the suction lift 2 - 4 intermediate layers will inevitably be carried with and subsequently laid on the stack of items on the pallet, and of which maybe 1 or 2 will fall off during handling. As a solution to this problem may be envisaged using a rolled up web of cardboard/paper/film having one or both sides

applied with non-skid coating, but here the layers in the roll will adhere to each other, which will be unsuitable, and therefore it will be necessary to indicate another solution to the problem.

5 It is the problem with the present invention to indicate a method of the kind indicated where the dispensed intermediate layer is applied non-skid coating, ready for further handling such as laying between layers of stackable items on a relevant pallet, and which can relieve the above drawbacks in handling intermediate layers provided with a non-skid coating or surface.

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Such a method is specified in characterising part of the claims 1 - 6.

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The advantage of the method is that the coating of the intermediate layers with a non-skid coating is accomplished during dispensing of the layers from the rolled up supply of cardboard, paper or film, the free end of which being passed across a cutter unit where individual intermediate layers are cut off in lengths to fit the load face of the pallet. The intermediate layers cut off the drawn out end of the free end of the rolled up web are thus successively applied non-skid coating simultaneously with they being dispensed and laid on the table for further handling, and the intermediate layers applied the non-skid coating are thus not touching each other as by the specified method it is supposed that the drawing out of the leading edge of the web across the table, where application of non-skid coating is effected, is only initiated when the previous intermediate layer has been removed from it. This means that individually cut intermediate layers will not touch each other by the method according to the invention.

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The non-skid coating is applied on at least one of the surfaces of the intermediate layer, but application will typically be effected at both sides for ensuring the best possible non-skid function of the intermediate layer. The non-skid coating may furthermore be applied as a number of stripes on the said surfaces, e.g. being a possibility in connection with stacking items that have mutually facing sides with a suitably large area.

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The coating of the intermediate layer with non-skid coating may also be performed

over the entire area of the intermediate layer, providing all items stacked on the pallet being secured against sliding.

5 The application of non-skid coating on the intermediate layer may occur either by extrusion as hotmelt or as spray application in a way known per se. Of the known preferred methods for application, those may be mentioned indicated in the characterising part of claim 5, however without excluding the right to use other known methods of application.

10 The non-skid coating may advantageously be constituted by a "hotmelt" medium, thus achieving a very rapid stabilisation of the non-skid coating, enabling the dispensed sheet to be used as intermediate layer immediately after dispensing.

15 A sheet dispenser for performing the method according to the invention includes a web of cardboard/paper/film rolled up in a supply, feeding means for drawing out the free end of the rolled up supply, a table having a surface preferably constituted by feeding means for the free end drawn out of the rolled up supply and a mechanical cutter unit that may cut off the intermediate layer with a length suited for the pallet concerned, and is peculiar in that the sheet dispenser includes a unit for successive
20 application of a non-skid coating on the underside and/or the upper side of the part of the free end of the length drawn out over the cutter unit and passed over the cutting edge on the mechanical cutter unit, as specified in claim 7.

25 The feeding means for drawing out the free end of the rolled up supply may advantageously be constituted by interacting pressure rollers.

30 With the purpose of enabling application of the non-skid coating on the intermediate layers as stripes, the feeding means for the drawn out free end of the length are constituted by a number of interspaced, synchronously driven conveyor belts, and that the unit for successive application of the non-skid coating on the underside and/or the upper side of the part over the cutter unit of the free end of the length drawn out from the rolled up supply includes a number of interspaced application nozzles disposed in one or more of the interspaces between the conveyor belts, as specified in claim 8.

The sheet dispenser for performing the method according to the invention may advantageously be used for dispensing intermediate layers in connection with loading pallets or the like with stackable items with a palletising machine, including an elevating and lowering as well as pivotable handling arm which is equipped with at least one articulated joint, and the free end of which is provided with a holding element in the shape of a vacuum holder for gripping single items, and a control unit for controlling the handling arm, the vacuum holder and the sheet dispenser, and by which vacuum holder intermediate layers of e.g. paper/cardboard/film are laid between the single layers of stackable items so that after laying of each layer of stackable items between respective item layers there is laid an intermediate layer from the sheet dispenser by using the vacuum holder on the handling arm, as specified in claim 9. Hereby is attained a solution to the problem concerning handling intermediate layers in connection with loading pallets with stackable items, so that only one intermediate layer is laid by means of the suction lift.

By the invention there is thus specified a method for dispensing non-skid intermediate layers in such a way that subsequent operation may be performed in an easy and unencumbered way after dispensing and for disposing the intermediate layers upon layers of stacked items on a pallets, e.g. with a palletising machine of prior art type.

The invention is explained more closely subsequently with reference to the drawing, where:

Fig. 1 is a top view of a sheet dispenser for intermediate layers, according to the invention,

Fig. 2 is a side view of the machine shown in Fig. 1,

Fig. 3 is a top view of a palletising unit with a sheet dispenser according to the invention, and

Fig. 4 is a side view of the palletising unit shown in Fig. 3.

Fig. 1 is a top view of an embodiment of a sheet dispenser 32 according to the present invention for dispensing intermediate layers 2 from a web 4 of paper/cardboard/film from a rolled up supply 6, se also Fig. 2.

The sheet dispenser 34 includes feeding means 16 for drawing out the free end 14 from the rolled up supply 6. The feeding means are typically constituted by mutually interacting rollers between which the free end 14 of the web 4 may be placed.

5 The sheet dispenser 34 also includes a table 20 and, close to the feeding means 16 for drawing out the free end 14 of the web 4 from the supply 6, a mechanical cutter unit 22, the knife of which being oriented transversely of the longitudinal direction of the table for cutting off the part of the web 4 having its end drawn forth a suitable length by means of the feeding means 18 on the table 20. In the shown embodiment, the feed-
10 ing means 18 are constituted by interspaced, synchronously driven conveyor belts 36, and where in the interspaces 40, close to the mechanical cutter unit 22, there are disposed application nozzles 38 for applying a non-skid coating 28 on the underside 24 of the intermediate layer 2 during advancing the free end 14 of the web 4 over the mechanical cutter unit 22. The conveyor belts 36 will ensure that the intermediate layer 2
15 will be stretched out on the table 20 before as well as after it has been cut off the web 4 by the mechanical cutter unit 22.

The sheet dispenser also includes diverse necessary sensors for detecting how far the free end 14 of the web 4 has been moved along the table 20, which is of significance
20 for achieving the right size of the intermediate layer 2 and for activating the unit 34 for successive application of non-skid coating 28 on upper and/or lower side 24 , 26 of the free end 14, before it is cut off by the mechanical cutter unit 22, whereby a piece of intermediate layer 2 is formed. Furthermore, sensors are provided for detecting whether an intermediate layer is present on the table 20, as this is of importance for
25 activating the feeding means for drawing out the web 4 from the rolled up supply 6 for conveying on the table 20 by the interspaced, synchronously driven conveyor belts 36 that constitute the feeding means 18 of the drawn out part 14 of the web 4. The said sensors (not shown) are connected to a control unit 50 in a known way, controlling the operations of the sheet dispenser as described below.

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The sheet dispenser 32 functions in the way that after detecting by a relevant sensor on the table 20 that an intermediate layer is not present on the table, a drawing out of the free end 14 of the web 4 by the feeding means 16 is performed, whereby the free end

14 is passed across the transverse mechanical cutter unit 22 and out upon the spaced conveyor belts 36 that are activated simultaneously with the rollers 16. In the shown embodiment of the sheet dispenser 32 according to the invention, during advancing of the free end 14 of the web 4, a number of stripes 30 of non-skid coating 28 are applied at the underside 24 of the web 4 by the unit 34 via application nozzles 38 disposed in the interspaces 40 between the conveyor belts 36. This successive application of the non-skid coating is continued until the control system receives signal from a relevant sensor that the free end 14 of web 4 has been moved to a preferred point on the table 20 corresponding to a preferred length, counted from the distance between leading edge 15 of the free end 14 of the web 4 and the mechanical cutter unit 22, of one piece of intermediate layer 2, which is formed immediately after by activation of the mechanical cutter 22 cutting the web 4, so that the intermediate layer, now applied with stripes 30 non-skid coating 28, lies ready for further conveying/laying upon a layer 8 of items 10 stacked on a pallet 12. By activating the mechanical cutter unit 22, the synchronous running of the conveyor belts 36 is stopped.

Removal of the intermediate layer 2 from the table 30 is detected by a sensor (not shown), and the above procedure is repeated.

Figs. 3 and 4 are a top view and a side view, respectively, of a palletising unit including a palletising machine 42 for laying stackable items 10 in layers 8 on a pallet 12. The palletising machine 42 includes a handling arm 44 with at least one articulated joint 46, and provided with a holding member 48, which in the shown embodiment is constituted by a vacuum lifter, for handling stackable items 10 that are supplied e.g. from a production line 52 to a pallet 12 upon which the items 10 are disposed in layers 8. As it appears from the drawing, the palletising unit furthermore includes a sheet dispenser 32 from where dispensed intermediate layers 2, which according to the invention are applied a layer of non-skid coating 28 at the underside 24 during dispensing, are taken by the vacuum lifter 48 from the table 20 for placing upon each of the already laid layers 8 of stacked items 10 on the pallet 12. The control unit 50 for the sheet dispenser 32 may be connected with the control unit (not shown) of the palletising machine, but this will not be strictly necessary due to the sheet dispenser 32's reacting to detection of whether a piece of intermediate layer 2 is present on the table 20

or not.

Thus there is indicated a sheet dispenser 32 enabling formation of intermediate layers 2 of paper/cardboard/film for laying upon layers 8 of stacked items 10 on a pallet 12 as well as a complete palletising unit including the sheet dispenser according to the invention.

It is to be mentioned that the inventor has realised that the sheet dispenser and the method according to the invention include other embodiments than those described above and displayed in the drawings. For example, the sheet dispenser may include nozzles for applying a layer of non-skid coating 28 on the upper side 26 of the intermediate layer 2, as well as the feeding means for advancing the drawn out part 14 of the web 4 can be constituted by other means than spaced, synchronously driven conveyor belts.

Reference numbers:

	2	intermediate layer
	4	web of cardboard/paper/film
20	6	supply (rolled up) of 2
	8	layers of stackable items
	10	stackable items
	12	pallet
	14	free end of web 4
25	15	leading edge of free end 14
	16	feeding means for drawing out 14 from 6
	18	feeding means for drawn out part of 14
	20	table
	22	mechanical cutter unit
30	24	underside of 2
	26	upper side of 2
	28	non-skid coating
	30	stripes of 28 on 24 and 26

	32	sheet dispenser
	34	unit for successive laying of non-skid coating on 24 or 26
	36	interspaced, synchronously drive conveyor belts
	38	interspaced application nozzles on 34
5	40	interspaces between 36
	42	palletising machine
	44	handling arm
	46	articulated joint on 44
	48	holding member (vacuum holder) on 44
10	50	control unit
	52	production line

CLAIMS

1. Method for dispensing an intermediate layer (2) of cardboard/paper/film from a web (4) rolled up in a supply (6), preferably for laying between layers (8) of stackable items (10) on pallets (12), where the free end (14) of the rolled up supply (6) is moved by feeding means (16, 18) across a table (20) that includes a mechanical cutter unit (22) which is cutting an intermediate layer (2) from the web (4) with a length suitable for an actual pallet size, and from which table (20) the cut intermediate layer (2) is ready for further handling for interposing and laying between the layers (8) of stackable items (10) on a relevant pallet (12), **characterised in that** at least on one of the surfaces (24, 26) of the intermediate layer (2) a non-skid coating (28) is applied during the drawing out of the intermediate layer from the rolled up web (4) of cardboard/paper/film.
2. Method according to claim 1, **characterised in that** the non-skid coating (28) is applied as a number of stripes/lengths (30) on the said surface(s) (24, 26).
3. Method according to claim 2, **characterised in that** the number of stripes (30) of non-skid coating (28) applied to the said surface(s) (24, 26) of an intermediate layer is in the range 2 - 10, typically 2 - 5, and preferably 2 - 4.
4. Method according to claim 2 or 3, **characterised in that** the stripes (30) of non-skid coating (28) are evenly distributed over the intermediate layer (2).
5. Method according to any of claims 1 - 4, **characterised in that** non-skid coating (28) is applied to the surface(s) (24, 26) by atomisation by nozzle, swirl-application, or by slot coating.
6. Method according to any of claims 1 - 5, **characterised in that** the non-skid coating (28) is constituted by a hotmelt medium.
7. Sheet dispenser (32) for dispensing an intermediate layer (2) according to any of

claims 1 - 6, of the kind including a web (4) of cardboard/paper/film rolled up in a supply (6), feeding means (16) for drawing out the free end (14) of the rolled up supply (6), a table (20) having a surface preferably constituted by feeding means (18) for the free end (14) drawn out of the rolled up supply and a mechanical cutter unit (22) that may cut off the intermediate layer (2) with a length suited for the pallet (12) concerned, **characterised in that** the sheet dispenser (32) includes a unit (34) for successive application of a non-skid coating (28) on the underside (24) and/or the upper side (26) of the part of the free end (14) of the length (4) drawn out over the cutter unit (22) and passed over the cutting edge on the mechanical cutter unit (22).

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8. Sheet dispenser (32) according to claim 7, **characterised in that** the feeding means (18) for the drawn out free end (14) of the length (4) are constituted by a number of interspaced, synchronously driven conveyor belts (36), and that the unit (34) for successive application of the non-skid coating (28) on the underside (24) and/or the upper side (26) of the part over the cutter unit (22) of the free end (14) of the length (4) drawn out from the rolled up supply (6) includes a number of interspaced application nozzles (38) disposed in one or more of the interspaces (40) between the conveyor belts (36).

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9. Use of a sheet dispenser (32) according to claim 7 or 8 for performing the method according to any of claims 1 - 6 for dispensing intermediate layers (8) in connection with loading pallets (12) or the like with stackable items (10) with a palletising machine (42), including an elevating and lowering as well as pivotable handling arm (44) which is equipped with at least one articulated joint (46), and the free end of which is provided with a holding element (48) in the shape of a vacuum holder for gripping single items (10), and a control unit (50) for controlling the handling arm (44), the vacuum holder (48) and the sheet dispenser (32), and by which vacuum holder (48) intermediate layers (2) of e.g. paper/cardboard/film are laid between the single layers (8) of stackable items (10) so that after laying of each layer (8) of stackable items (10) between respective item layers there is laid an intermediate layer (2) from the sheet dispenser by using the vacuum holder (48) on the handling arm (44).

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ABSTRACT

When stacking stackable items (10) in layers (8) on pallets (12), intermediate layers (2) of paper/cardboard/film are often used for preventing loss of the items during transport. Even though the intermediate layers ensure to a large extent that items do not fall off the pallet, it cannot be entirely prevented that some of the stacked items fall off because the stacked items are sliding on the intermediate layers.

Special intermediate layers (2) are known, having a surface coated with non-skid coating (28) which highly counteracts the unwanted sliding of the items in the layers (8) stacked on a pallet.

However, the laying of intermediate layers with non-skid surfaces constitutes a problem as the individual pieces of intermediate layer will adhere to each other when the surfaces of the pieces are provided with non-skid coating.

Thus there is provided a method and a sheet dispenser where pieces of intermediate layers (2) are successively dispensed, and where these layers (2) are coated with non-skid coating during dispensing.

Fig. 1

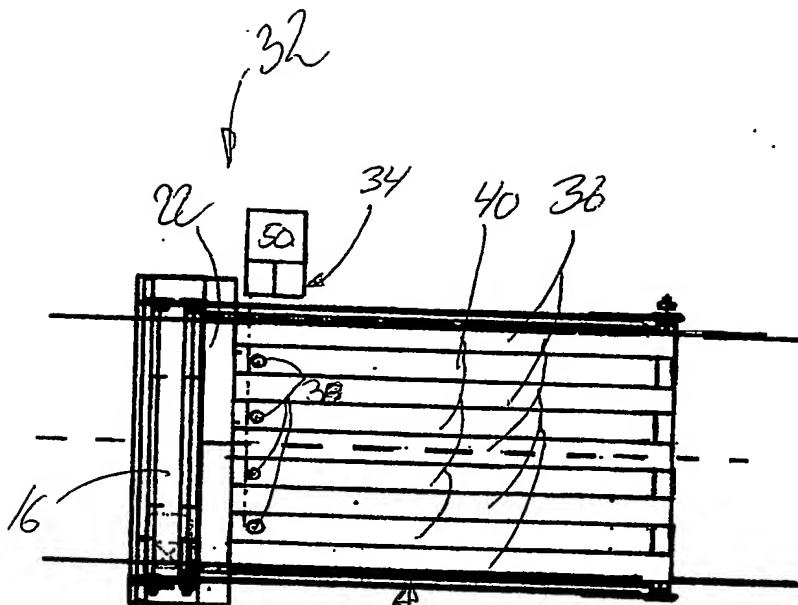
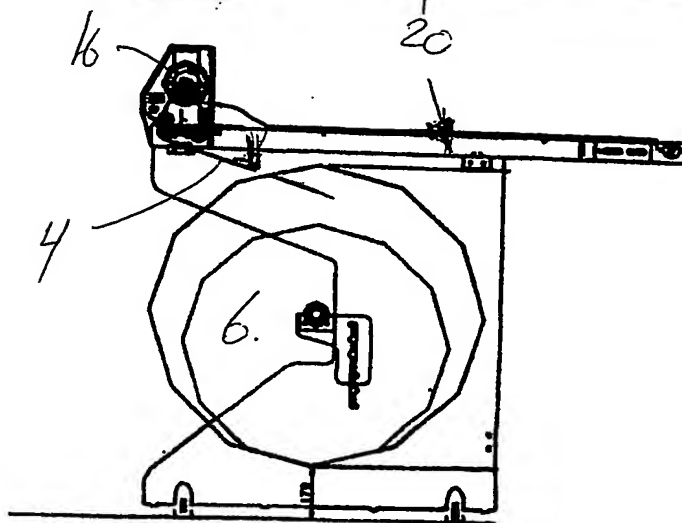


Fig. 2



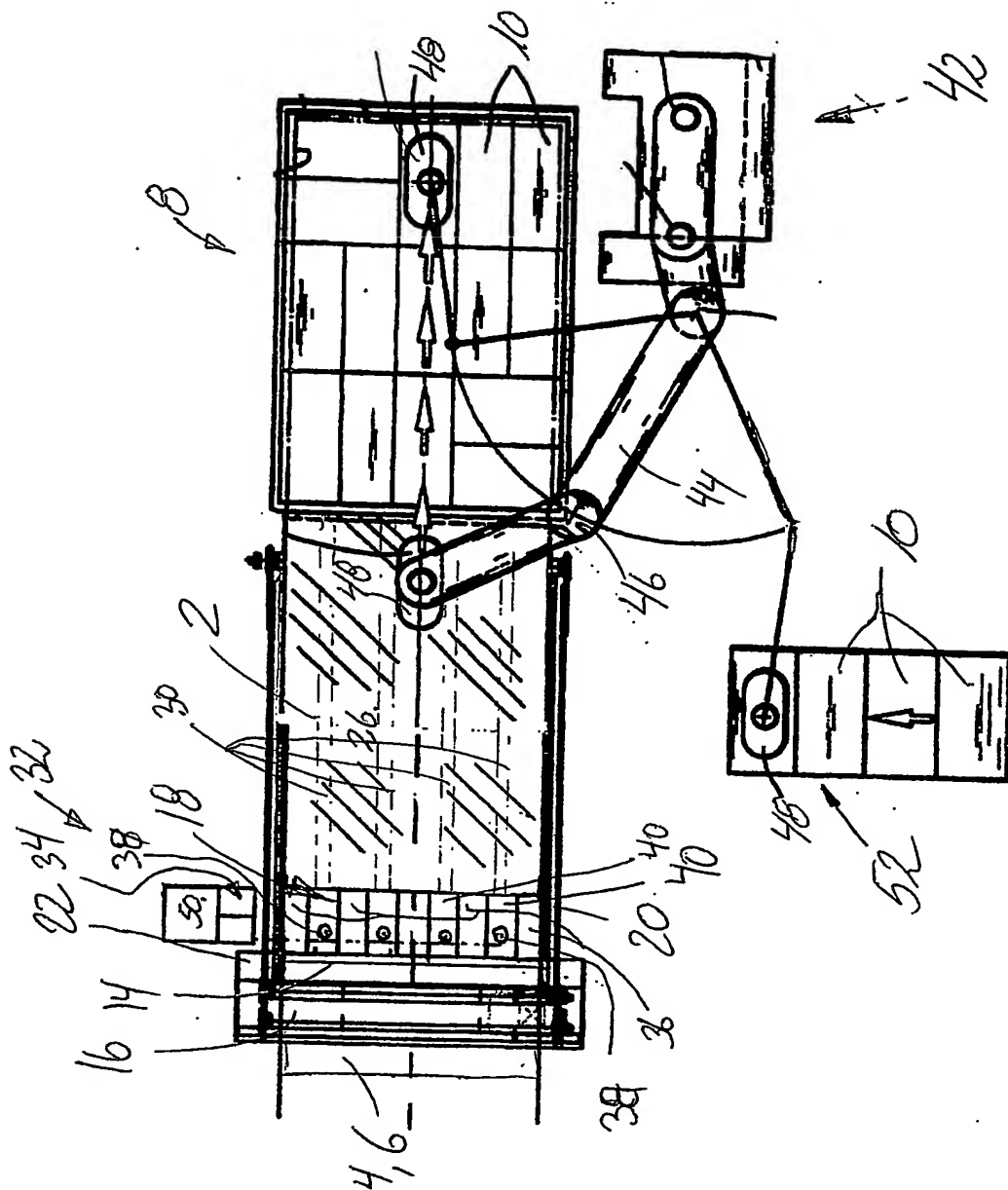


Fig. 31

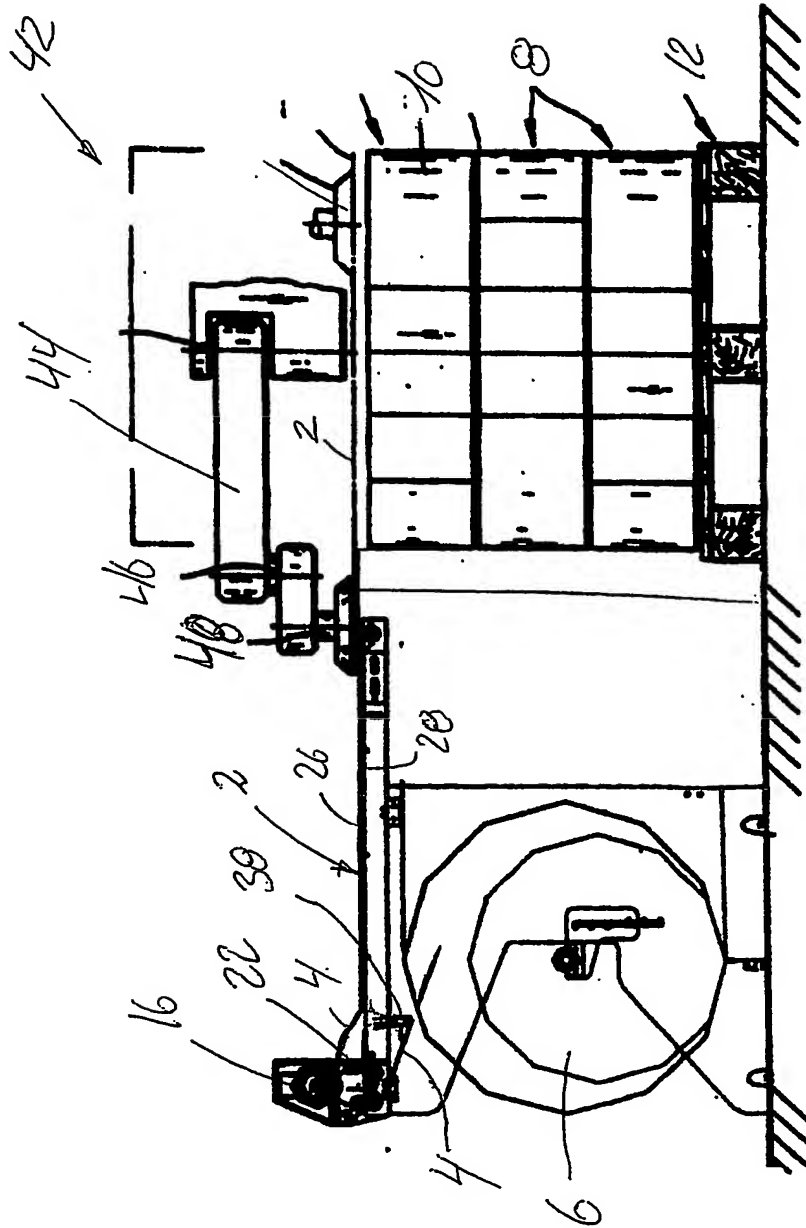


Fig. 4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/DK 03/00647

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B65G 57/03

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: B65G; B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4941374 (FOCKE), 17 July 1990 (17.07.90) -----	1-9



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

18 December 2003

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INTERNATIONAL SEARCH REPORT
Information on patent family members

31/10/03

International application No.

PCT/DK 03/00647

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US	4941374	17/07/90	BR	8803134 A	08/02/89
			CA	1305193 A,C	14/07/92
			DE	3720933 A	05/01/89
			DE	3886595 D	00/00/00
			EP	0296346 A,B	28/12/88
			JP	1017718 A	20/01/89
			JP	2520938 B	31/07/96
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